

THAT WHICH IS CLAIMED:

1. A non-destructive inspection device for inspecting a feature of a structure, the inspection device comprising:

an actuating portion having at least one magnet, wherein the actuating portion is structured for placement on a first surface of the structure such that the actuating portion is movable relative to the structure; and

an inspecting portion having an inspection sensor and at least one magnet, wherein the inspecting portion is structured for positioning on a surface of the structure opposite the first surface such that the inspecting portion is magnetically coupled to the actuating portion so that movement of the actuating portion causes the inspecting portion to move in concert with the actuating portion without the inspecting portion directly contacting the actuating portion.

2. A non-destructive inspection device according to Claim 1, further comprising a second inspecting portion having a second inspection sensor and at least one magnet, wherein the actuating portion has a second magnet such that the inspecting portion is structured for positioning on a surface of the structure opposite the first surface such that the feature of the structure to be inspected is located between the first inspecting portion and the second inspecting portion, wherein the second inspecting portion is magnetically coupled to the actuating portion so that movement of the actuating portion causes the second inspecting portion to move in concert with the actuating portion without the second inspecting portion directly contacting the actuating portion, and wherein the first inspecting portion and the second inspecting portion are in a generally fixed relative position with respect to each other when each is magnetically coupled to the actuating portion.

3. A non-destructive inspection device according to Claim 2 wherein the inspection sensor of the first inspecting portion comprises an ultrasonic transmitter and the second inspection sensor of the second inspecting portion comprises an ultrasonic receiver.

4. A non-destructive inspection device according to Claim 3 wherein the first inspecting portion includes an array of ultrasonic transmitters and the second inspecting portion includes an array of ultrasonic receivers.

5. A non-destructive inspection device according to Claim 4 wherein the first inspecting portion includes a plurality of magnets, the second inspecting portion includes a plurality of magnets, and the actuating portion includes a first plurality of magnets magnetically coupled to the plurality of magnets of the first inspecting portion and includes a second plurality of magnets magnetically coupled to the plurality of magnets of the second inspecting portion.

6. A non-destructive inspection device according to Claim 5 wherein the first inspecting portion includes a set of rollers proximate the plurality of magnets, the second inspecting portion includes a set of rollers proximate the plurality of magnets, and the actuating portion includes a set of rollers proximate the first plurality of magnets and the second plurality of magnets.

7. A non-destructive inspection device according to Claim 6 wherein the actuating portion includes a handle for manual positioning of the actuating portion.

8. A non-destructive inspection device according to Claim 6 wherein the actuating portion includes a motorized drive wheel for motorized positioning of the actuating portion.

9. A non-destructive inspection device according to Claim 8 wherein the actuating portion includes a positional encoder device to monitor the positioning of the actuating portion.

10. A non-destructive inspection device according to Claim 1 wherein the inspecting portion includes a positional encoder device to monitor the positioning of the actuating portion.

11. A non-destructive inspection device according to Claim 1 wherein the inspection sensor of the inspecting portion comprises a laser ultrasonic transducer.

12. A non-destructive inspection device according to Claim 1 wherein the inspection sensor of the inspecting portion comprises an optical borescope.

13. A non-destructive inspection device for inspecting a feature of a structure, the inspection device comprising:

an actuating portion having a first plurality of magnets and a second plurality of magnets, wherein the actuating portion is structured for placement on a first surface of the structure such that the actuating portion is movable relative to the structure;

a first inspecting portion having a first inspection sensor and a first plurality of magnets, wherein the first inspecting portion is structured for positioning on a surface of the structure opposite the first surface such that the first inspecting portion is magnetically coupled to the first plurality of magnets of the actuating portion so that movement of the actuating portion causes the first inspecting portion to move in concert with the actuating portion without the first inspecting portion directly contacting the actuating portion; and

a second inspecting portion having a second inspection sensor and a second plurality of magnets, wherein the actuating portion has a second plurality of magnets such that the inspecting portion is structured for positioning on a surface of the structure opposite the first surface such that the feature of the structure to be inspected is located between the first inspecting portion and the second inspecting portion, wherein the second inspecting portion is magnetically coupled to the second plurality of magnets of the actuating portion so that movement of the actuating portion causes the second inspecting portion to move in concert with the actuating portion without the second inspecting portion directly contacting the actuating portion, and wherein the first inspecting portion and the second inspecting portion are in a generally fixed relative position with respect to each other when each is magnetically coupled to the actuating portion.

14. A non-destructive inspection device according to Claim 13 wherein the first inspection sensor of the first inspecting portion comprises an ultrasonic transmitter and the second inspection sensor of the second inspecting portion comprises an ultrasonic receiver.

15. A non-destructive inspection device according to Claim 14 wherein the first inspecting portion includes an array of ultrasonic transmitters and the second inspecting portion includes an array of ultrasonic receivers.

16. A non-destructive inspection device according to Claim 15 wherein the actuating portion includes a handle for manual positioning of the actuating portion.

17. A non-destructive inspection device according to Claim 15 wherein the actuating portion includes a motorized drive wheel for motorized positioning of the actuating portion.

18. A non-destructive inspection device according to Claim 17 wherein the actuating portion includes a positional encoder device to monitor the positioning of the actuating portion.

19. A non-destructive inspection device according to Claim 13 wherein at least one inspecting portion includes a positional encoder device to monitor the positioning of the inspecting portion.

20. A method of inspecting a feature of a structure, comprising the steps of:
placing an actuating portion of a non-destructive inspection device on a first surface of the structure, wherein the actuating portion has at least one magnet;

positioning at least one inspecting portion of the non-destructive inspection device on a surface of the structure opposite the first surface, wherein the inspecting portion has an inspection sensor and at least one magnet such that positioning the inspecting portion comprises magnetically coupling the magnet of the actuating portion to the magnet of the inspecting portion;

moving the actuating portion on the first surface of the structure such that the inspecting portion is moved in concert with actuating portion; and

monitoring an output from the inspection sensor.

21. A method according to Claim 20, further comprising the step of positioning a second inspecting portion of the non-destructive inspection device on a surface of the structure opposite the first surface such that the feature of the structure to be inspected is located between the first inspecting portion and the second inspecting portion, wherein the second inspecting portion has a second inspection sensor and at least one magnet such that positioning the second inspecting portion comprises magnetically coupling a second magnet of the actuating portion to the magnet of the second inspecting portion such that the second inspecting portion is moved in concert with the actuating portion during the moving step.

22. A method according to Claim 21, further comprising the steps of:
transmitting an ultrasonic signal from the first inspection sensor through the
feature of the structure to be inspected; and
receiving the ultrasonic signal in the second inspection sensor to generate the
output to be monitored.